

UNDERSTANDING ASTROBIOLOGY THROUGH REALISTIC LABORATORY EXPERIENCES. M. Fauerbach, M.J. Mon, and T. Ueda, Whitaker Center for Science, Technology and Mathematics Education; Florida Gulf Coast University; 10501 FGCU Blvd.; Ft. Myers, FL 33965-6565.

Introduction: Due to its broad multidisciplinary science context, astrobiology is a useful platform of general science courses for undergraduate non-science majors. Astrobiology offers the opportunity to actively engage the students in the scientific process by using inquiry-based, hands-on activities taking advantage of research from a broad range of scientific disciplines. Unfortunately, the classroom activities developed for the majority of introductory astrobiology courses consist mostly of paper exercises. During the summer of 2006 we developed and taught an innovative course, utilizing the multidisciplinary aspect of astrobiology to enhance the scientific knowledge and literacy of students. The novelty of our course lies in the use of (biotechnology) research equipment in the activities themselves, giving the students a realistic research laboratory environment as part of their general science education. The activities are integrated under the common theme of the study of life in the universe, a topic of attraction to the general student population. The laboratory equipment utilized is common to most college biology departments. Due to the multidisciplinary nature of astrobiology and use of inquire-based activities, the class is ideally suited for pre-service science teachers. With this in mind, we made sure that we model best teaching practices and that the content is aligned with National Science Standards. The course is associated with the highly successful Project LAUNCH [1], a grant funded K-12 (in-service) teacher developmental program, which was developed by the Whitaker Center for Science, Mathematics and Technology Education at Florida Gulf Coast University.

Goals: The goals of the Introductory Astrobiology class can be summarized as follows:

- Increase overall science content as well as realistic scientific research experience in undergraduate general science courses for non-science majors with a special emphasis on pre-service teachers
- Utilize the broad multidisciplinary context of astrobiology to cover a wide range of content in science (biology, physics, and astronomy) and mathematics.
- Introduce the use of biotechnology research equipment to provide a more realistic science research experience.

- Utilize the Conceptual Change Model (CCM) in the implementation of inquiry based hands-on exercises that enhance both teaching and learning, thus being ideally suited for pre-service science teachers.
- Use the attractive and common theme of the study of life in the universe to improve and sustain knowledge and interest in space related programs.

In order to achieve these goals, we:

- Provide a risk-free environment where every student feels liberated to voice their initial thoughts. This is important to uncover prior misconceptions.
- Bring pre-service teachers together with non-education students (mainly non-science majors); thus providing pre-service teachers with direct student level response to the inquiry learning experience.
- Focus on small group interaction utilizing not just paper exercises, but also the use of biotechnology research equipment in the activities themselves.
- To enhance most of the biological key concepts, we utilized activities which involve the use of typical biotechnology laboratory equipment. These activities included but were not limited to: bacterial culture and growth, microscopy, anaerobic metabolism, spectrophotometry, genetic transformation, genetic mutation, DNA extraction, Polymerase Chain Reaction, and gel electrophoresis.

References: [1] M. Fauerbach, D. P. Henry, D. L. Schmidt, (2005) *LPS XXXVI*, Abstract #1094.

Acknowledgement: The Project LAUNCH astrobiology curriculum was developed by: T. Ueda, M.J. Mon, M. Fauerbach, A. Benvie, L. Southard and D.L. Schmidt.